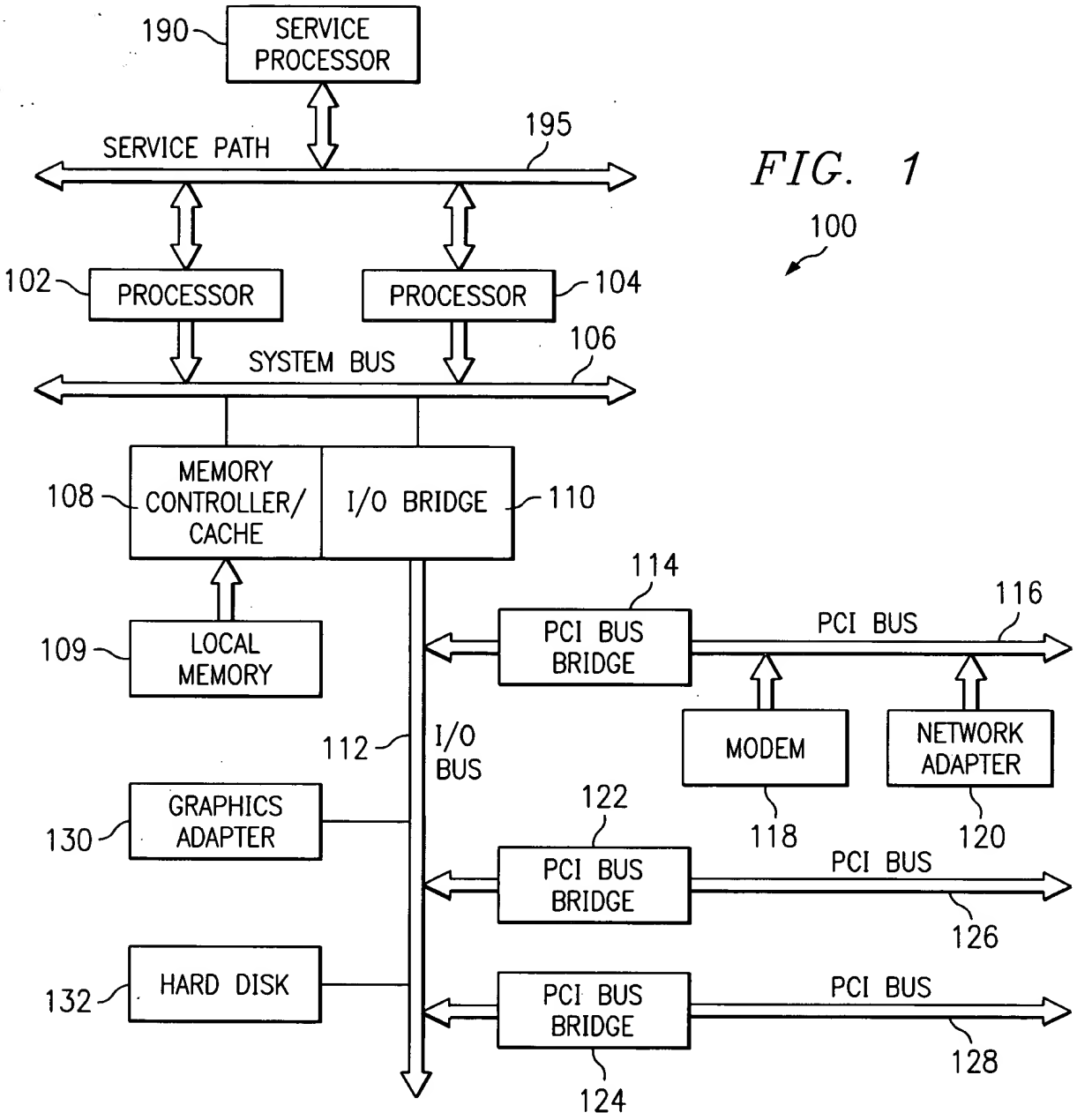

190
SERVICE PROCESSOR
SERVICE PATH
195
100
102
PROCESSOR
PROCESSOR
104
SYSTEM BUS
106
108
MEMORY CONTROLLER/ CACHE
I/O BRIDGE
110
109
LOCAL MEMORY
114
PCI BUS BRIDGE
116
PCI BUS
112
I/O BUS
MODEM
NETWORK ADAPTER
118
120
122
130
GRAPHICS ADAPTER
PCI BUS BRIDGE
PCI BUS
126
132
HARD DISK
PCI BUS BRIDGE
PCI BUS
128
124

FIG. 1

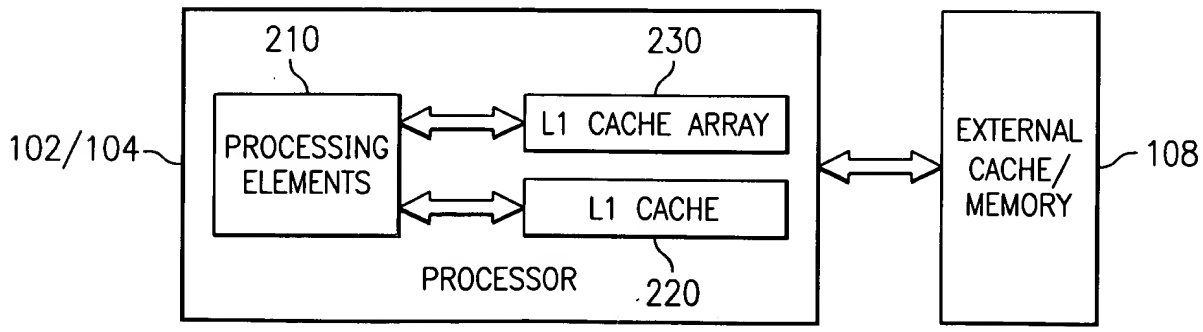

210
230
102/104
PROCESSING ELEMENTS
L1 CACHE ARRAY
L1 CACHE
PROCESSOR
220
EXTERNAL CACHE/ MEMORY
108

FIG. 2

FIG. 3

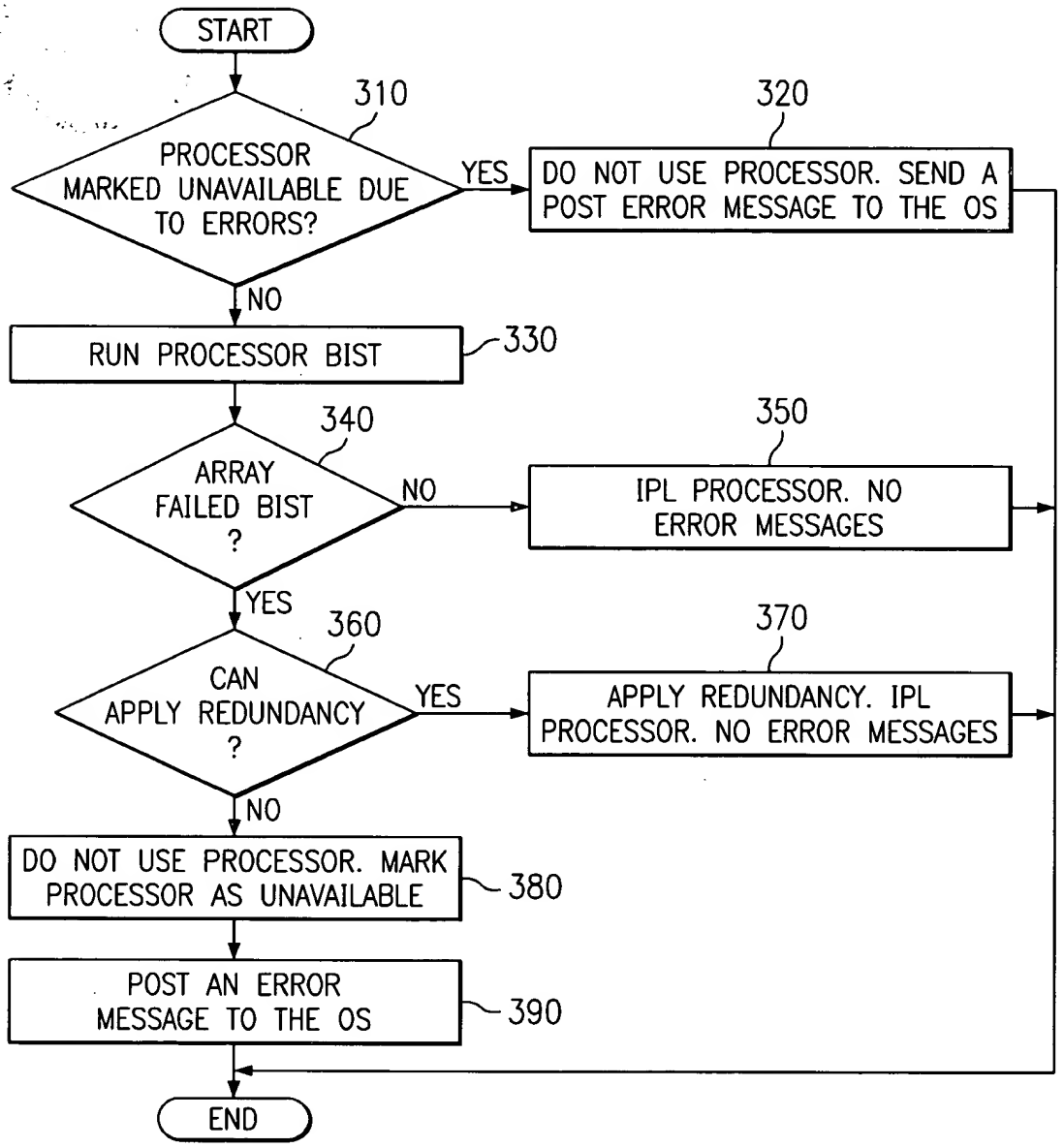

START
310
PROCESSOR MARKED UNAVAILABLE DUE TO ERRORS?
YES
320
DO NOT USE PROCESSOR. SEND A POST ERROR MESSAGE TO THE OS
NO
RUN PROCESSOR BIST
330
340
ARRAY FAILED BIST ?
NO
350
IPL PROCESSOR. NO ERROR MESSAGES
YES
360
CAN APPLY REDUNDANCY ?
YES
370
APPLY REDUNDANCY. IPL PROCESSOR. NO ERROR MESSAGES
NO
DO NOT USE PROCESSOR. MARK PROCESSOR AS UNAVAILABLE
380
POST AN ERROR MESSAGE TO THE OS
390
END

FIG. 4

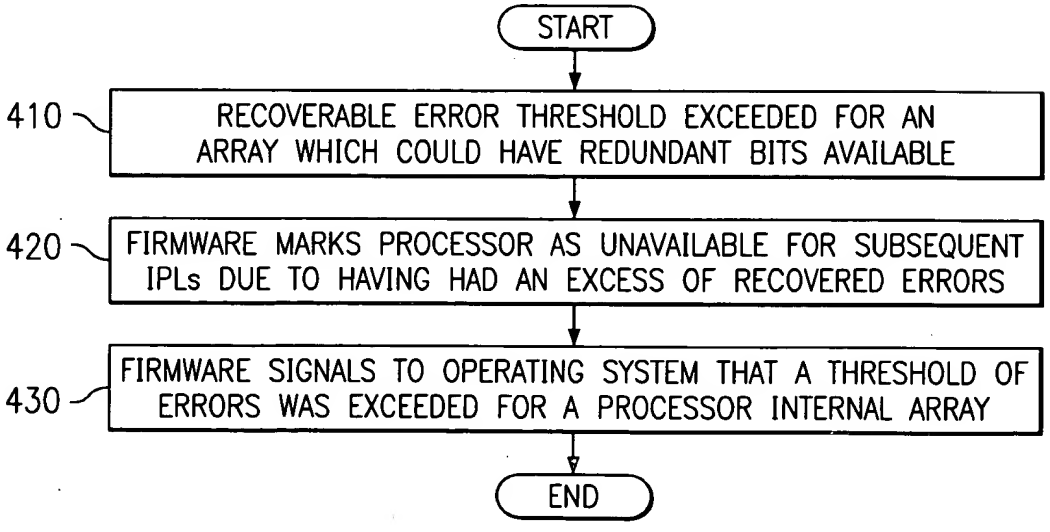

START
410
RECOVERABLE ERROR THRESHOLD EXCEEDED FOR AN ARRAY WHICH COULD HAVE REDUNDANT BITS AVAILABLE
420
FIRMWARE MARKS PROCESSOR AS UNAVAILABLE FOR SUBSEQUENT IPLs DUE TO HAVING HAD AN EXCESS OF RECOVERED ERRORS
430
FIRMWARE SIGNALS TO OPERATING SYSTEM THAT A THRESHOLD OF ERRORS WAS EXCEEDED FOR A PROCESSOR INTERNAL ARRAY
END

FIG. 5

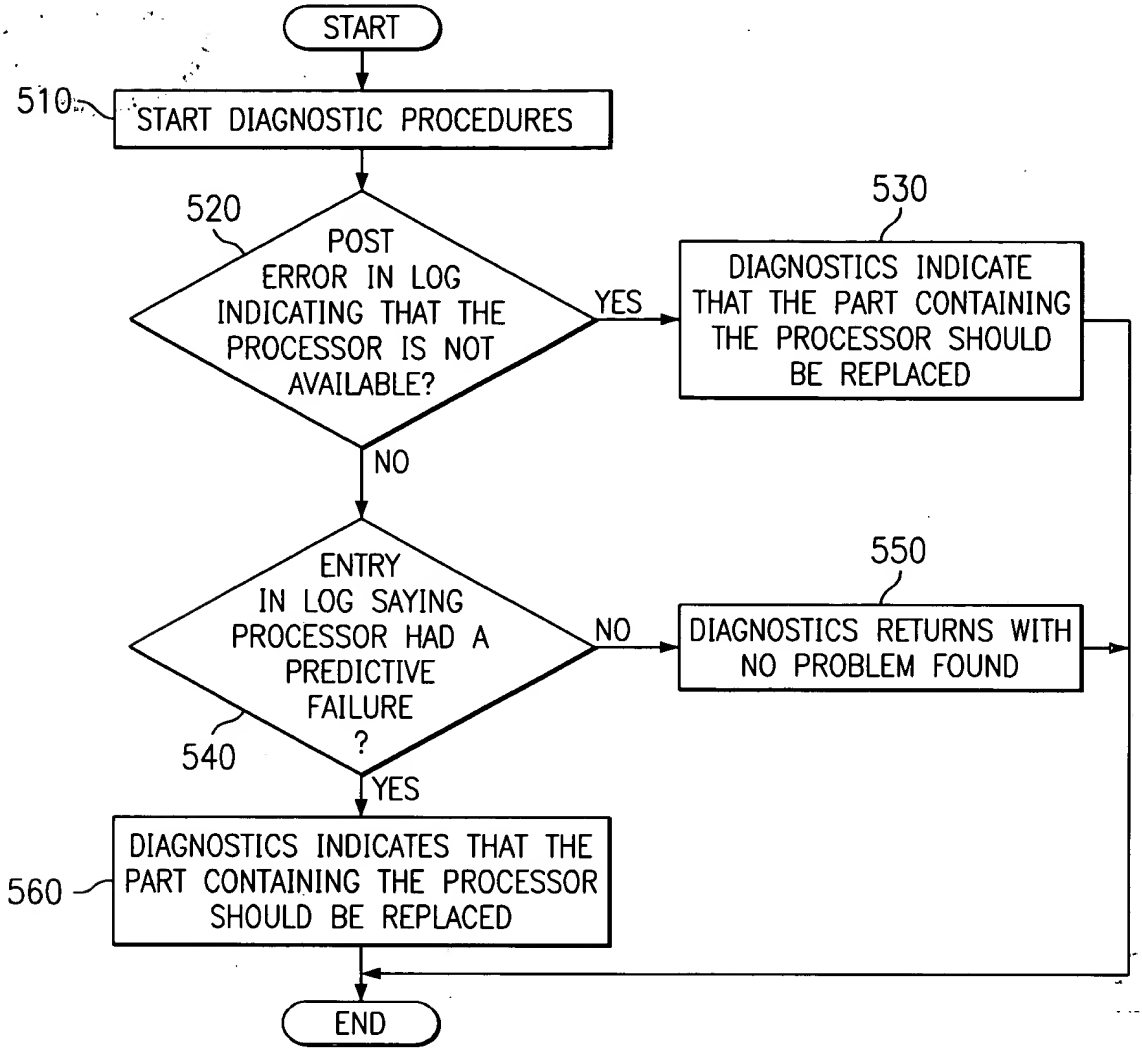

START
510
START DIAGNOSTIC PROCEDURES
520
POST ERROR IN LOG INDICATING THAT THE PROCESSOR IS NOT AVAILABLE?
YES
530
DIAGNOSTICS INDICATE THAT THE PART CONTAINING THE PROCESSOR SHOULD BE REPLACED
NO
ENTRY IN LOG SAYING PROCESSOR HAD A PREDICTIVE FAILURE ?
NO
550
DIAGNOSTICS RETURNS WITH NO PROBLEM FOUND
540
YES
560
DIAGNOSTICS INDICATES THAT THE PART CONTAINING THE PROCESSOR SHOULD BE REPLACED
END

FIG. 6

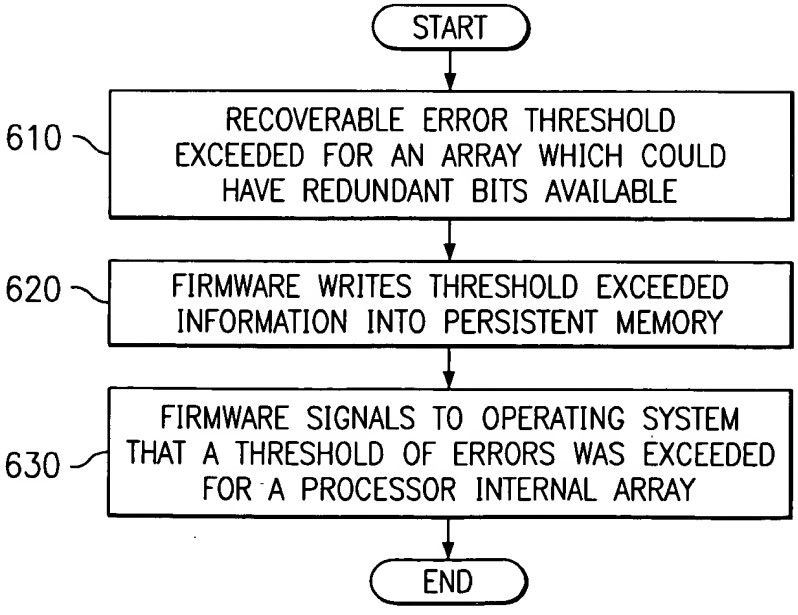

START
610
RECOVERABLE ERROR THRESHOLD EXCEEDED FOR AN ARRAY WHICH COULD HAVE REDUNDANT BITS AVAILABLE
620
FIRMWARE WRITES THRESHOLD EXCEEDED INFORMATION INTO PERSISTENT MEMORY
630
FIRMWARE SIGNALS TO OPERATING SYSTEM THAT A THRESHOLD OF ERRORS WAS EXCEEDED FOR A PROCESSOR INTERNAL ARRAY
END

FIG. 7

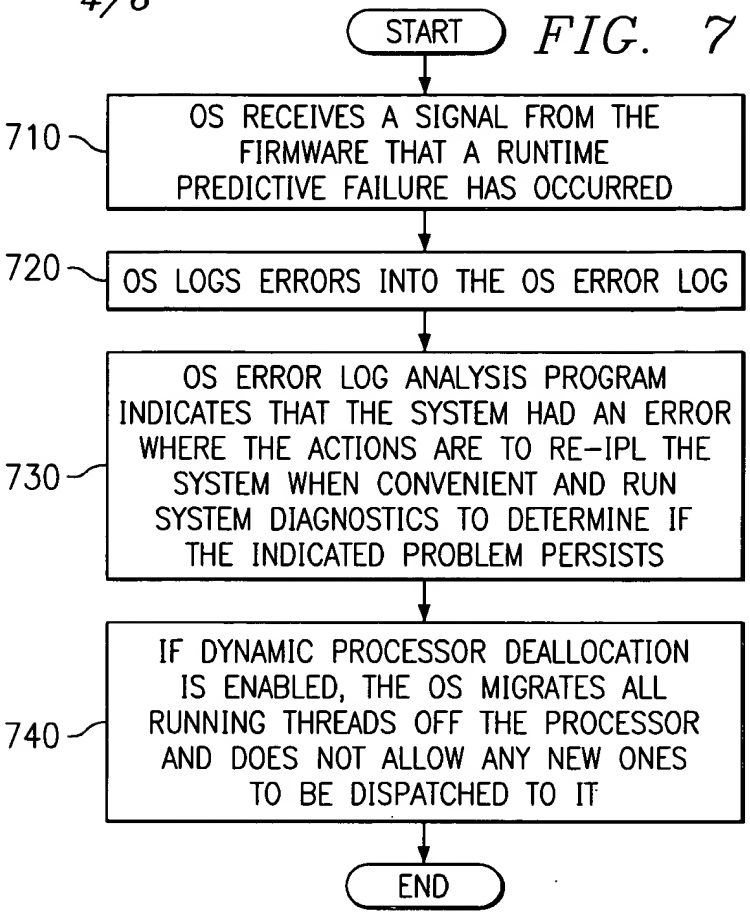

START
710
OS RECEIVES A SIGNAL FROM THE FIRMWARE THAT A RUNTIME PREDICTIVE FAILURE HAS OCCURRED
720
OS LOGS ERRORS INTO THE OS ERROR LOG
730
OS ERROR LOG ANALYSIS PROGRAM INDICATES THAT THE SYSTEM HAD AN ERROR WHERE THE ACTIONS ARE TO RE-IPL THE SYSTEM WHEN CONVENIENT AND RUN SYSTEM DIAGNOSTICS TO DETERMINE IF THE INDICATED PROBLEM PERSISTS
740
IF DYNAMIC PROCESSOR DEALLOCATION IS ENABLED, THE OS MIGRATES ALL RUNNING THREADS OFF THE PROCESSOR AND DOES NOT ALLOW ANY NEW ONES TO BE DISPATCHED TO IT
END

FIG. 9

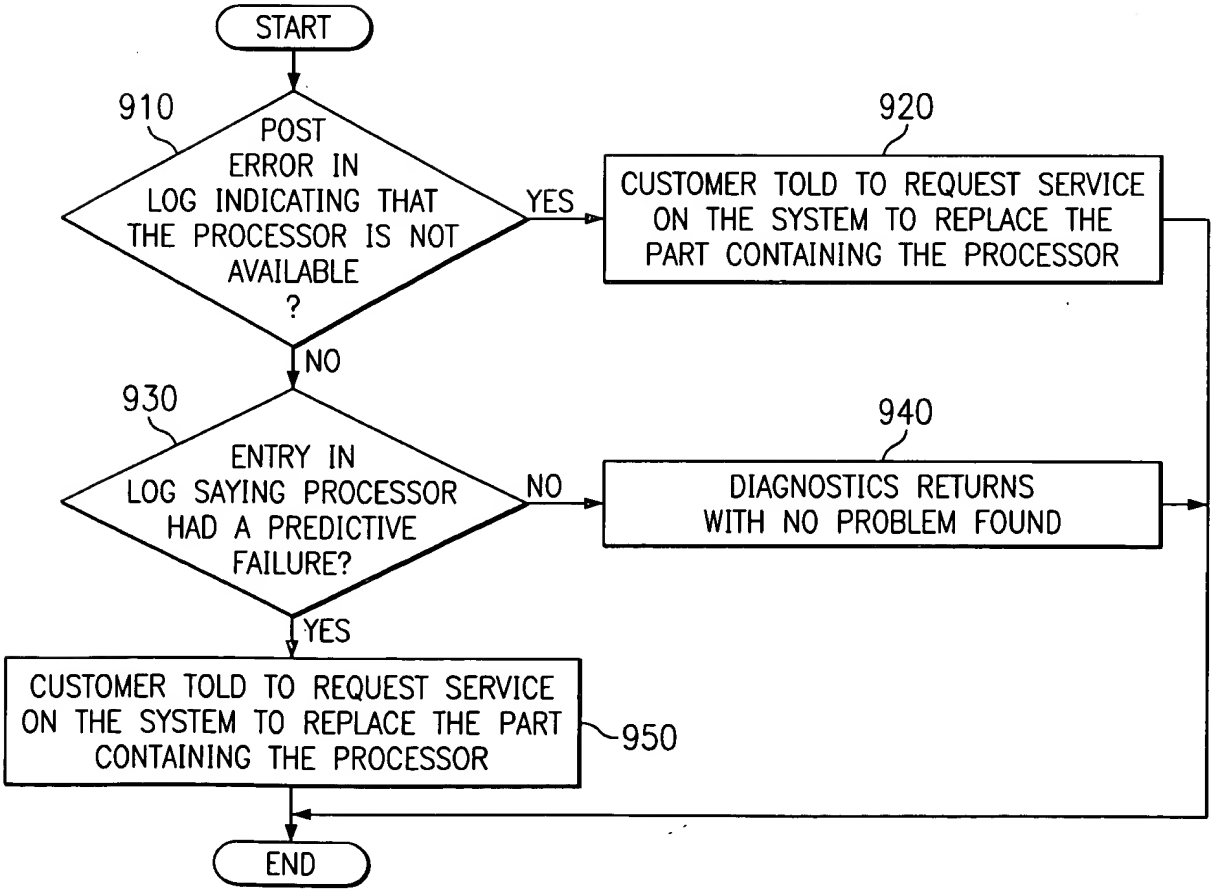

START
910
POST ERROR IN LOG INDICATING THAT THE PROCESSOR IS NOT AVAILABLE ?
YES
920
CUSTOMER TOLD TO REQUEST SERVICE ON THE SYSTEM TO REPLACE THE PART CONTAINING THE PROCESSOR
NO
930
ENTRY IN LOG SAYING PROCESSOR HAD A PREDICTIVE FAILURE?
NO
940
DIAGNOSTICS RETURNS WITH NO PROBLEM FOUND
YES
CUSTOMER TOLD TO REQUEST SERVICE ON THE SYSTEM TO REPLACE THE PART CONTAINING THE PROCESSOR
950
END

FIG. 8

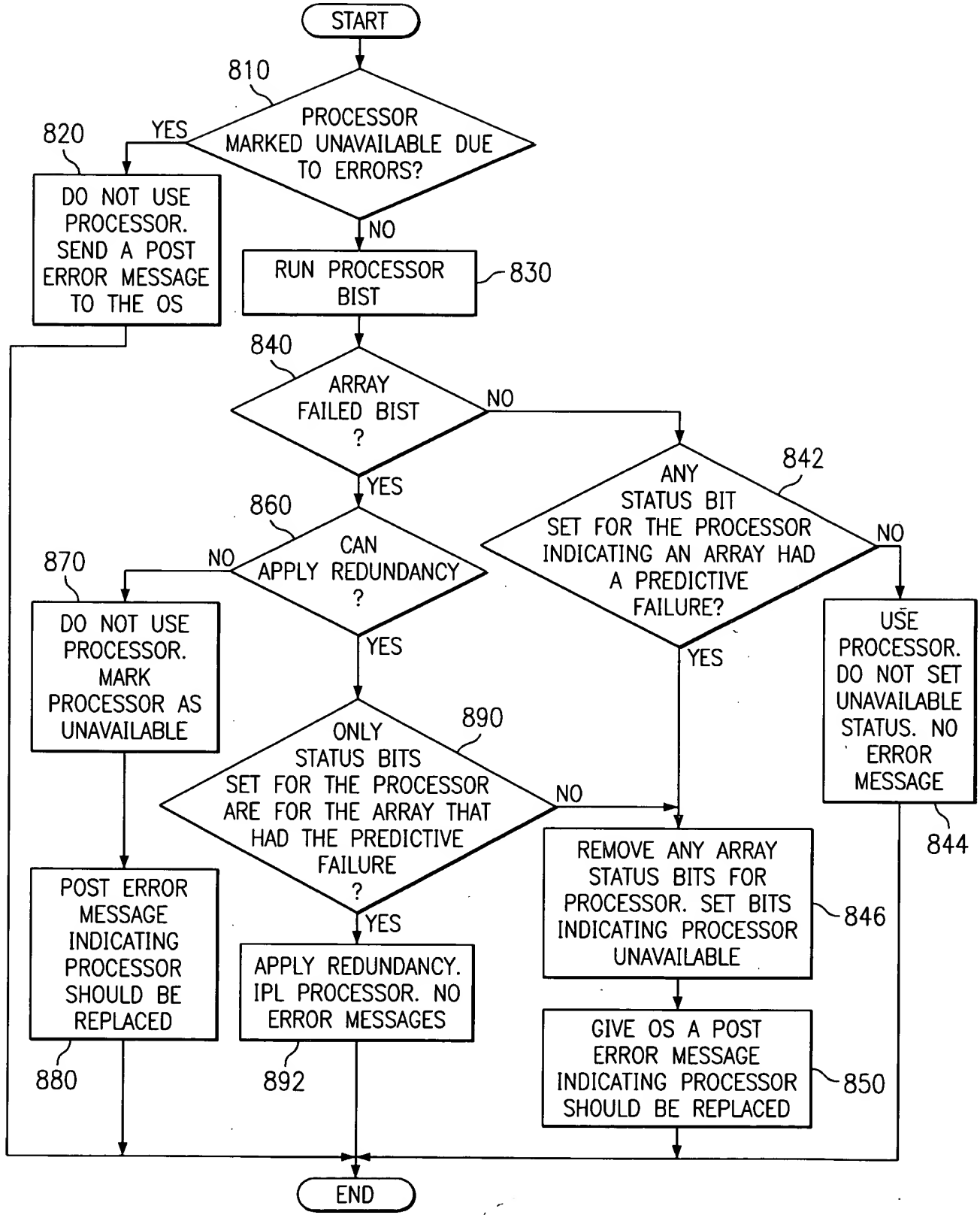
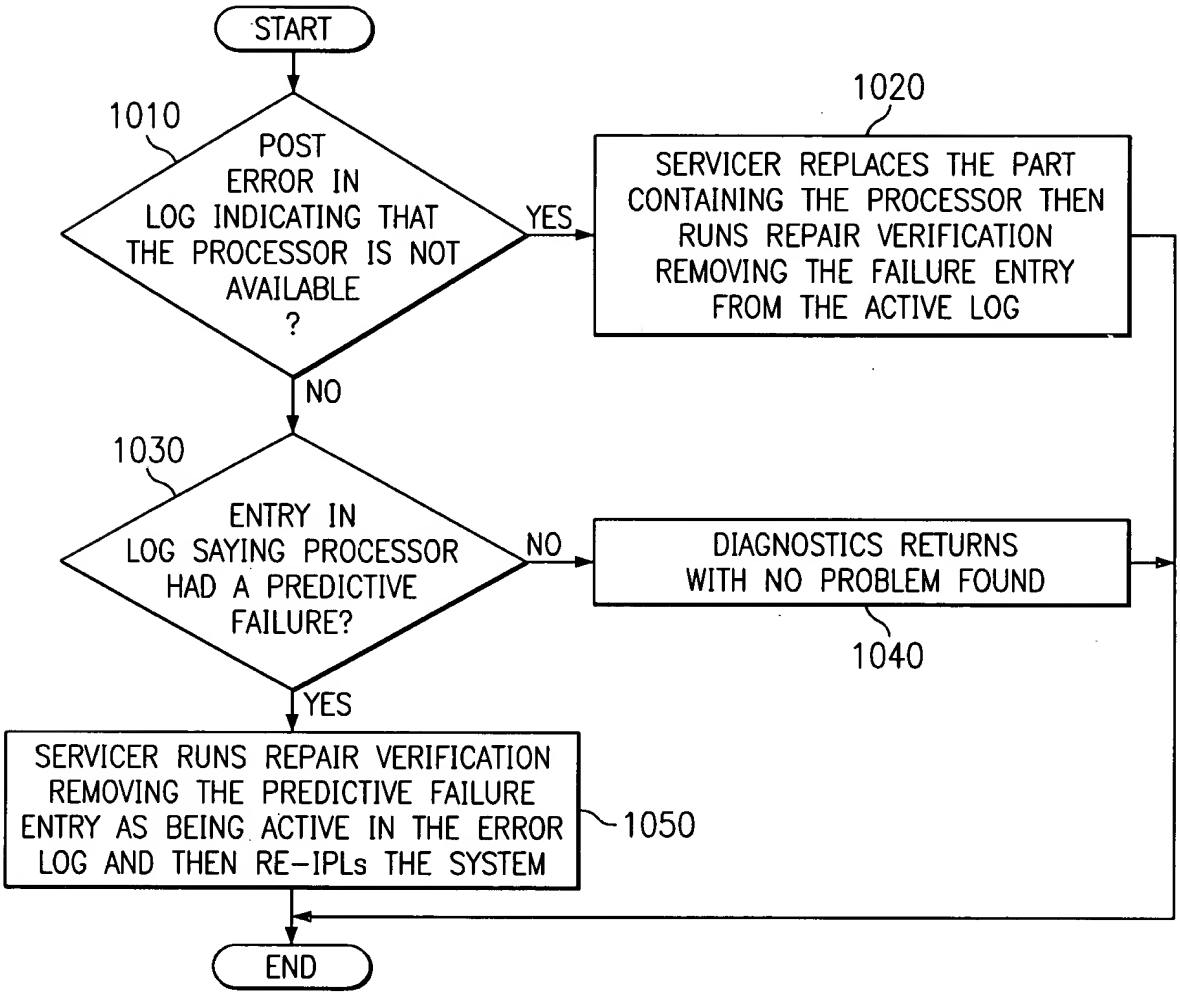

START
810
PROCESSOR MARKED UNAVAILABLE DUE TO ERRORS?
YES
820
DO NOT USE PROCESSOR. SEND A POST ERROR MESSAGE TO THE OS
NO
RUN PROCESSOR BIST
830
840
ARRAY FAILED BIST ?
NO
YES
842
ANY STATUS BIT SET FOR THE PROCESSOR INDICATING AN ARRAY HAD A PREDICTIVE FAILURE?
NO
YES
USE PROCESSOR. DO NOT SET UNAVAILABLE STATUS. NO ERROR MESSAGE
844
860
CAN APPLY REDUNDANCY ?
NO
870
DO NOT USE PROCESSOR. MARK PROCESSOR AS UNAVAILABLE
YES
890
ONLY STATUS BITS SET FOR THE PROCESSOR ARE FOR THE ARRAY THAT HAD THE PREDICTIVE FAILURE ?
NO
YES
REMOVE ANY ARRAY STATUS BITS FOR PROCESSOR. SET BITS INDICATING PROCESSOR UNAVAILABLE
846
GIVE OS A POST ERROR MESSAGE INDICATING PROCESSOR SHOULD BE REPLACED
850
POST ERROR MESSAGE INDICATING PROCESSOR SHOULD BE REPLACED
880
APPLY REDUNDANCY. IPL PROCESSOR. NO ERROR MESSAGES
892
END

FIG. 10


START
1010
POST ERROR IN LOG INDICATING THAT THE PROCESSOR IS NOT AVAILABLE ?
YES
1020
SERVICER REPLACES THE PART CONTAINING THE PROCESSOR THEN RUNS REPAIR VERIFICATION REMOVING THE FAILURE ENTRY FROM THE ACTIVE LOG
NO
1030
ENTRY IN LOG SAYING PROCESSOR HAD A PREDICTIVE FAILURE?
NO
DIAGNOSTICS RETURNS WITH NO PROBLEM FOUND
1040
YES
SERVICER RUNS REPAIR VERIFICATION REMOVING THE PREDICTIVE FAILURE ENTRY AS BEING ACTIVE IN THE ERROR LOG AND THEN RE-IPLs THE SYSTEM
1050
END